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11 TITLE (Include Security Classification)
Performance Oriented Packaging (POP) Testing of Charge, Propelling, 8 inch, M188A1, Packed one per PA92 Square Rim Metal Ammunition Container.

12 PERSONAL AUTHOR(S)
Raymond J. Siroy

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2. Ammunition Packaging
3. PA92 Ammunition Metal Container
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19 ABSTRACT (Continue on reverse if necessary and identify by block number)
This Performance Oriented Packaging (POP) report is for the Propelling Charge, 8 inch, M188A1, packed one per PA92 Square Rim metal Ammunition Container in accordance with drawing 9331255. This report describes the results of testing conducted with simulated propellant.

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DEPARTMENT OF THE ARMY
U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ 07806-5000

REPLY TO
ATTENTION OF

SMCAR-AEP (1mm)

09 DEC 1993

MEMORANDUM FOR Commander, Defense Technical Information Center,
Building 5, Cameron Station, Alexandria, VA 22304-6145

SUBJECT: Release of Performance Oriented Packaging Compliance Reports

1. The enclosed report (DOD POP HMTR/AYD 93-030) entitled: "Performance Oriented Packaging (POP) Testing of Charge, Propelling, 8 Inch, M188A1, Packed One per PA92 Square Rim Metal Ammunition Container" is hereby submitted to the Defense Technical Information Center for formal release. Please send notification of formal release to:

U.S. Army Armament Research, Development and Engineering Center
Picatinny Arsenal, NJ 07806-5000

2. If there are any problems, questions, or comments regarding these reports, contact Mr. Raymond Siroy at 201-724-2181 (DSN 880-2181).

Encl
as

Steve Ruffini
ROBERT J. KUPER
Chief, Packaging Division

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I. Report Number: DOD POP HMTR/AYD 93-030

II. Title: Performance Oriented Packaging (POP) testing of Charge, Propelling, 8 Inch, M188A1, Packed One per PA92 Square Rim Metal Ammunition Container

Drawing Number: 9331255

Author: Raymond J. Siroy

Performing Activity: U.S. Army Armament Research, Development and Engineering Center (ARDEC)

Address: Department of the Army
Commander, U.S. Army ARDEC
Attn: SMCAR-AEP
Picatinny Arsenal, N.J. 07806-5000

Date: December 1993

1. DATA SHEET:

a. CONTAINER:

Type: Removable head steel drum
UN Code: 1A2
Part Number: 9331197
Spec Number: MIL-C-63461
Material: Steel
Capacity: 29.5 liters
Dimensions:

Inside Diameter	=	8.25 in. min.
Outside Diameter Flat	=	9.24 in. max.
Inside Length	=	33.75 in. min.
Outside Length	=	36.68 in. max.

Closure (Method/Type): Cover shaft is locked into slots on container rim.

Tare Weight: 10.0 kg (22.0 lbs)

b. PRODUCT:

Name: Charge, Propelling, 8 inch, M188A1, for 8 inch HOW SP M110A2
United Nations Proper Shipping Name: Charges, Propelling, for Cannon
United Nations Number: 0242
Drawing Number: 11829092
Hazard Class: 1.3 Class
Physical State: Solid
Net Weight of Hazard Component: 48 pounds (estimated)
United Nations Packing Group: II
Amount Per Container: 1

c. TEST MATERIALS:

Name: Simulated Propellant
Physical State: Solid
Size: Diameter = 8.25 inches
Length = 33.75 inches
Quantity: Enough simulated propellant to fill up container
Gross Weight: 80 pounds (36.3 kg)

2. BACKGROUND:

This report contains the testing and test results performed for Performance Oriented Packaging Certification of Charge, Propelling, 8 inch, M188A1, packed one (1) per PA92 square rim metal ammunition container in accordance with drawing 9331255. Tests were performed in accordance with Part 178, Subpart M - Testing of Non-bulk Packaging and Packages, Title 49 of the Code of Federal Regulations (CFR).

3. INTRODUCTION:

The Department of Transportation (DOT) per Code of Federal Regulations (CFR), Title 49, Parts 100-180, dated 1 Oct 92, requires that hazardous materials should be packed in a container that passes the Performance Oriented Packaging (POP) tests.

PA92 metal ammunition container, part number 9331197, is being used as shipping container for Propelling Charge, 8 inch, M188A1. The package contains one propelling charge, 8 inch, M188A1 per PA92 metal container in accordance with drawing 9331255.

POP tests were conducted using PA92 metal ammunition containers, each containing simulated propellant for a total gross weight of 80 pounds to insure that the tested weight is higher than the heaviest pack (estimated at 72 pounds) to insure container integrity. The tests were conducted in accordance with referenced sections of Code of Federal Regulations (CFR), Title 49 and are valid only when approved ammunition is packed in the PA92 container for the Department Of Defense.

A total of six (6) packed containers were POP tested in accordance with part 178, Subpart M-Testing of Non-bulk Packaging and Packages, Title 49 of the Code of Federal Regulations (CFR).

4. TESTS PERFORMED:

a. Drop Test

The Code of Federal Regulations (CFR), specifies that three containers should be used for each two drop orientations. Each three containers was dropped from a height of 1.2 meters (3.9 feet) in the following orientations: drop top down diagonally on the chime or edge of the container and drop top down on the closure of the container. A total of six (6) containers were used for two different orientations. The above procedures were performed in strict manner in accordance with paragraph 178.603 "Drop Test" of the CFR.

b. Vibration Test

Three (3) containers were placed on the vibrating platform and vibrated for a duration of one hour. The containers were unrestrained except horizontally to prevent them from falling off of the platform. The peak-to-peak displacement was one inch and the frequency was 300 rpm. This frequency was sufficient enough to allow the container to become completely airborne, enabling a 1/16 inch (.16 cm) thick piece of strapping materials to be slid underneath any of the container at any given time throughout the test. The above procedures were performed in strict manner in accordance with paragraph 178.608 "Vibration Standards" of the CFR.

c. Stacking Test

The Code of Federal Regulations (CFR), requires that the minimum height of the stack including the test sample must be 3.0 meters (10 feet). Three test samples are required. Each packed container has an individual weight of 80 pounds. A 3.0 meter stack height of samples is equivalent to 1039 pounds (472 kg) of stack weight. Three different test samples were each subjected to a stack weight of 1039 pounds for a period of 24 hours. The samples were then inspected and examined for any damage or distortion. The above procedures were performed in strict manner in accordance with paragraph 178.606 "Stacking Test" of the CFR.

5. PASS/FAIL (DOT CRITERIA):

a. A package for explosives is considered to successfully pass the drop tests if for each sample tested no rupture of the packing or spilling of the contents occurs.

b. A packaging passes the vibration test if there is no rupture or leakage from any of the packages.

c. A test sample passes the stacking test when no test sample leaks. No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength or cause instability in stacks of packages.

6. TEST RESULTS:

a. Drop Test

The first three drops (drop top down on the closure) did not do any damage on any of the three containers. On the second three drops (drop top down diagonally on the edge) of the container sustained slightly dent on the rim and ring, but there was no cracked, rupture or spillage. All packages tested passed the test.

b. Vibration Test

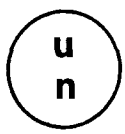
All three containers were removed from the platform after one hour vibration. Each of the container was physically inspected for any damage and leakage. All the containers tested were intact and showed no evidence of deterioration. There was no spillage or any damage of the container. All packages tested passed the test.

c. Stacking Test

All three containers were removed from the stacking platform after 24 hours of test. Each container was carefully inspected for any structural damage. All the containers tested were intact and showed no evidence of rupture or spillage. All packages passed the test.

7. CONCLUSION:

Based upon the above successful POP testing, the following UN POP symbol has been applied to the metal container in accordance with drawing 9331255.



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** Last two digits of year packed.